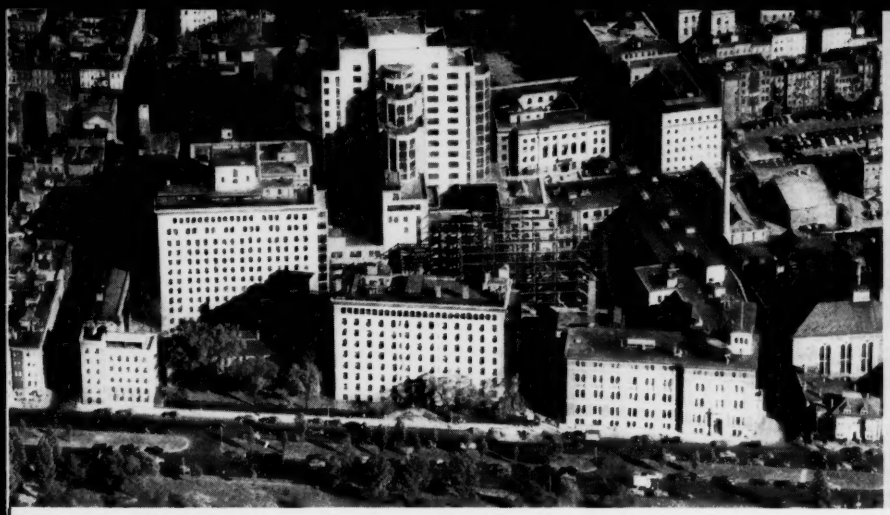


A New England Center of Medical Research: Massachusetts General Hospital.

Monthly Review

Federal Reserve Bank of Boston

Industrial Opportunities in New England

ATOMIC ENERGY

New England research, educational and industrial facilities are already participating extensively in the national atomic energy program in spite of the fact that no major Atomic Energy Commission installation is located in the area. For the next few years, New England should be able to increase its activity in this field by seeking more direct government contracts, by establishing itself more firmly as a center for atomic research and education, by supplying more of the services, instruments, special equipment and supplies needed by Government, medicine and industry, and possibly by doing research in cooperation with the Atomic Energy Commission to determine whether atomic energy might ultimately become an attractive source of power for New England.

Future possibilities, perhaps ten years from now, depend chiefly on research and development work not yet accomplished. This is especially true in the field of atomic or nuclear power generation. If the present belief of some who have studied the subject intensively is substantiated, the long-range potentialities for New England may be considerable and warrant close study and continuous review.

At the present time, atomic energy in its broadest sense is big business. The United States Government is by far the largest employer; as of December 1, 1951, the Atomic Energy Commission was supporting about 124,000 people, directly or through contractors. The A.E.C. appropriation for fiscal 1951 was $2 billion, and some proposals for new appropriations are considerably larger. Actual expenditure for fiscal 1951 was $918 million. Most of the expenditure is for military purposes in the fields of research and development, plant construction and operation, and manufacture of special devices and equipment.

A.E.C. Contracts

New England research institutions and industrial firms have been awarded contracts totaling over $500 million, according to the A.E.C. Public Information Service. A major part of this, however, is for construction work outside the area.

Three A.E.C. divisions — Biology and Medicine, Research, and Reactor Development — have forty-nine unclassified contracts in force at twenty-one colleges, universities, hospitals and other research institutions in five New England states. Grants for these contracts total upwards of $1,500,000 distributed as follows: Massachusetts—38 contracts; Connecticut—8; Rhode Island—1; Maine—1; and New Hampshire—1.

Additionally, there are a number of current A.E.C. contracts for classified work in New England. Practically all areas of study and experimentation of interest to the national Atomic Energy Program are covered in these contracts. To mention a few: sanitary engineering for radiation safety, metallurgy, raw materials processing, nuclear physics, medicine, biology, mathematics, agriculture and plant life. A major tool in nuclear physics research is the particle accelerator. The A.E.C.

This article is the third in a series of abstracts from the Arthur D. Little, Inc., study of Industrial Opportunities in New England. A reproduction of the complete study may be obtained for $2.00 on request to the Research and Statistics Department, Federal Reserve Bank of Boston, 30 Pearl Street, Boston 6, Massachusetts.

has contributed financial support to the building or operation of a number of these in New England.

New England industrial resources are also being tapped at many points. Both open and classified contracts show that in 1951 more than fifty companies held contracts totaling nearly $28 million. No detailed breakdown can be given for security reasons, but the state totals are as follows: Massachusetts—$24,100,000; Connecticut—$3,375,000; Rhode Island—$400,000; and Maine—$45,000.

In addition, there are contracts in New England for building a hull for an atomic-powered submarine and for development work on an engine for a nuclear-powered aircraft. The Government as well as industry and the medical profession also purchase instruments, special equipment and consulting services used in various phases of atomic work. In the instrument field, some 86 companies in the United States are producing radiation detection instruments; of these about 11 are located in New England. In the construction field, New England firms are prime contractors, subcontractors and consultants for the construction of atomic energy installations elsewhere in the country. In terms of employment for New England people, the value of such large construction contracts may be misleading, in that local workers may be employed first.

New England is also participating in the education of personnel for research, teaching and military purposes. Forty-three of the 343 holders of A.E.C. fellowships for the 1951-1952 academic year are pursuing their studies at New England institutions. A number of New England people are cooperating as individuals with the A.E.C. in various capacities. Three New England universities are participating in the operation of Brookhaven National Laboratory on Long Island, New York.

Although the record of New England activity in the atomic energy field is a very respectable one, most of the large items of expenditure by the A.E.C. are for the construction and operation of nuclear reactors and associated processes and the preparation of military devices. This work has not been located in New England, primarily because of New England's vulnerable location, the high cost of New England power relative to some other areas, and the fact that much of the research and subsequent development has been done elsewhere. These reasons should not deter development of industrial atomic power in New England nor prevent increased activity along present lines.

Isotopes

Most of New England's industrial activities in the atomic energy program are based directly or indirectly on A.E.C. expenditures. There is a certain amount of other atomic business, small by comparison, but noteworthy in terms of New England employment. It is based largely on the use of radioisotopes in industry, medicine and agriculture. New England skills are employed in developing, manufacturing and merchandising the instruments, special equipment and supplies required. Radioactive isotopes are used for research in various fields, for medical diagnosis and therapy, and as radiation sources for thickness gauges, radiographic equipment, and static eliminators.

It should be pointed out that in these applications New England is obtaining benefits of a different kind from the atomic energy program, namely, as a large *user* of radioactive isotopes. Of the 22,300 radioactive isotope shipments made by the A.E.C. through December 1951, almost 3,000 have gone to New England institutions and industries. Massachusetts maintained its position in 1951 as the second largest user of radioactive isotopes among the forty-eight states.

The benefits derived from the use of isotopes in research are difficult to measure, yet such applications of atomic energy may well prove to be the most important of all. The importance of increased knowledge of the functioning of the human body and its diseases and the better understanding of the mechanism of plant growth, for example, cannot be evaluated. In industry, the use of radioactive isotopes furnishes another tool for research in the development or improvement of a product or process. As a matter of research policy, New England manufacturers should consider applying radioactivity techniques to industry's problems.

For the next few years, reasonable growth is anticipated in Government-financed programs and in medical and industrial uses for isotopes. New England is in at least as favorable a spot to participate in this growth as other parts of the country because of its strength in the research, development, medical, and instrument-making fields. New England's strength is not so superior, however, but that the growth will have to be sought actively.

Atomic Energy as a Source of Power

After the next ten years, one of the big question marks in the atomic energy field is industrial atomic power. If atomic power is developed to a point where it can produce electricity at rates below those of modern commercial plants, New England is probably going to be affected more than some central and western areas in the United States because of its present higher cost of electricity.

The New England Council Committee on Atomic Energy has had as its objective for several years the gathering of information regarding the potential utilization of atomic energy as a source of power. This Committee has pointed out that New England is at a greater distance from coal mines than any other part of the industrial East, and therefore has much reason to be interested in a source of power which does not involve a consideration of freight costs or possible transportation tie-ups.

The industries which could benefit most are those producing the power and its by-products and those in which power is a major factor of cost. Since atomic power plants employ essentially weightless fuel, their locations might be selected to favor large power-using industries. Specific industries which normally require large blocks of power include ground wood pulp and newsprint; electrochemical products such as caustic, chlorine, and oxidizing agents; electrolytic products such as tin, aluminum, and magnesium; and materials made in an electric furnace such as alloys, abrasives, elemental carbon, and elemental phosphorus for chemical phosphates. Many of these industries are not now located in New England. Further study would be necessary, of course, to determine whether some of them

could be profitably located here, even if low-cost atomic power were available.

Because the major part of the cost of supplying domestic power to home consumers is in distribution, it is not clear to what extent the availability of low-cost atomic power in New England would stimulate the use of more electrical equipment. Potentially large power-consuming uses such as home heating with electric panels or electrically-driven heat pumps might well be accelerated. This would have a secondary effect on suppliers of equipment. The power companies themselves should, of course, also prosper with the increased use of their product. Lower power costs should correspond to an increase in productivity per man, and this in turn would lead to a higher standard of living.

The Outlook

What is the present outlook for atomic power? It is certain that atomic power in the form of electricity is technically possible now. It is already being produced experimentally, but only at a prohibitively high price for industry. Much has been spoken and written on the subject, and the views of authorities vary widely from pessimism to considerable optimism. Some of the most important factors have yet to be determined and the fact remains that as of this writing no one can say when or at what price industrial power will be possible. The Dow Chemical and Detroit Edison companies, the first of four groups to complete their preliminary study of industrial possibilities for atomic power, feel that the prospects are sufficiently encouraging to warrant spending more time and money in further investigation. An officer of the Monsanto Chemical Company, which is also a participant (in its St. Louis plant) in the program to develop atomic power, recently stated that commercial production "is perhaps four or five years away, measured in terms of full scale producing units." The Monsanto-Union Electric team has recommended the immediate design and construction of a pilot plant.

The most promising possibility for industrial atomic power publicly discussed today seems to be that of simultaneously producing electric power and valuable by-products to lower the net cost of each. By-products which might be produced include plutonium or uranium 233, made from uranium 238 and thorium. These are fissionable and might be used for military weapons or as a fuel to continue the operation of the power plant, or, if a sufficient excess were produced, as a fuel for other reactors or mobile power sources in submarines, ships, and airplanes. Other by-products might include radioactive materials, the radiations of which may be used for sterilizing drugs, food products, etc.; and possibly some of the rare earths which have been found useful as constituents of alloys and special glasses; low pressure steam, and so forth.

Breeders

Probably one of the most important factors in the development of nuclear power for industry is whether or not a power reactor can be built to produce significantly more fissionable material than it consumes — in other words, if it can be a "breeder" of fuel. If so, the economic picture becomes potentially more attractive because of the high value of the by-product, and the long-range fuel supply situation becomes more reassuring. Recently, Keith Glennan, one of the commissioners of the A.E.C., stated in effect that the energy that might be derived from recoverable uranium that can be mined throughout the world at realistic costs exceeds substantially that energy which resides in the world's reserves of coal and oil. Since over 99 per cent of this uranium is present as uranium 238, which is incapable of sustaining a chain reaction, some means must be provided to convert this uranium 238 into plutonium 239 which might be used as a nuclear fuel. A successful breeder reactor would accomplish this and allow the fuller utilization of our uranium and thorium supply. [Note: A recent announcement states that "breeding" has been successfully demonstrated.]

Interrelated questions of what industrial nuclear power will cost, when it will be feasible, and whether the fuel supply can be efficiently utilized will be resolved only by further study of methods of operating a reactor to produce breeding and by study of other difficult chemical and metallurgical problems. Cost-accounting studies must also consider questions of who will make the capital outlay for the plant and what the price and market for by-products will be.

Much will be learned from the present Government-financed efforts to build a nuclear reactor for submarine propulsion, a reactor for power plus breeding, and similar projects. Canadian and British atomic energy interests may also provide clues as to future trends in atomic power, since these countries are active in the field and have considerable to gain from the peculiar advantages of atomic energy for industrial purposes.

Little has been said, purposely, about the possibilities of thermo-nuclear reactors in which low atomic weight elements such as hydrogen and lithium, abundantly available materials, might be used as the fuel in a nuclear fusion process. Like its opposite, the fissioning process, nuclear fusion results in a release of large quantities of energy. It has been stated that no peacetime values can be seen in the development of the fusion bomb because the reaction cannot be controlled in an orderly way to produce power in a reactor. It has also been stated more recently that controlled thermo-nuclear reactions form the real hope for a source of energy in the distant future. Very little public knowledge exists on this subject and one can only speculate. The imagination cannot help but be fascinated with the idea that if the reaction could be controlled, there would be possibilities of unlimited fuel supply, high temperature source of heat, less stringent critical mass requirements and much less transient and residual radioactivity which would simplify shielding, remote handling, waste disposal, and other problems which hamper nuclear fission processes. More may be known as to the ultimate practicability of controlling the reaction from A.E.C.'s hydrogen bomb work. Recent "columnist" rumors suggest that tests of the thermo-nuclear reaction may be made later this year.

The prospects for New England in the next few years are probably most favorable in developments where research and New England technical skills are important, such as instruments and special devices, radioactive materials, and general participation in the Government atomic research program. In the event of in-

dustrial atomic power, New England stands to benefit more than some other areas of the country because of the possibility for new industries here which would require large amounts of low-cost power. A part of the interest and value to New England of the opportunities offered by atomic energy also derives from the fact that it is a new, fast-growing field, heavily financed by the Government and requiring the technical skills which New England possesses.

What should New England be doing immediately and for the next ten years to assure itself of the best possible position in the over-all atomic energy field for the future? There are four main courses of action which should be considered:

1. New England should keep informed and alert to opportunities offered by atomic energy in order to be able to make proper use of them at the appropriate time.[1]

2. Direct contracts with the Government are now held by many New England institutions and companies for research and development on military items and construction of plants. The Government-financed atomic energy program is expanding and the Commission is urging more industries to participate. New England should seek its share of contracts in order to establish New England as an atomic energy research, development, service and supply center and attract the construction of atomic energy sites here in the future.

3. Power and other interested companies in New England should consider studying the practicability of construction and operation of nuclear reactors in New England for the production of power, nuclear fuel, and possibly other by-products. These studies would be made at the company's expense, but with the cooperation of the Atomic Energy Commission. A press release dated April 6, 1952, by the A.E.C. describes the Commission's offer along this line. Such a study would provide an opportunity for New England companies to place themselves in a favorable position for an early start toward atomic power. A member of the Industrial Power Branch, Division of Reactor Development, Atomic Energy Commission, has stated in a private communication that "perhaps the greatest benefit of the (so-called) 'atomic age' will be in the use of the atom for power generation. New England especially stands to gain from this development, since fuel and power costs there are among the highest in the nation. Power generation is one of the Commission's prime objectives, and it has often been stated publicly that the Commission confidently feels that atomic energy will contribute . . . to the nation's power production."

4. New England could actively seek increased markets in industry, medicine and Government programs for the products and services which New England is in a favorable position to manufacture in the atomic field.

[1]Some helpful sources of information include: *Nucleonics*, published by McGraw Hill; *Atomic Energy Newsletter*, by Atomic Energy News, Inc.; A.E.C. publications such as *Semi-Annual Report*, *Isotopes*, and *Nuclear Science Abstracts*.

NEW ENGLAND EMPLOYMENT POTENTIALS IN ATOMIC ENERGY DEVELOPMENTS

The list below is an outline of representative though not necessarily all-inclusive subjects which today seem to be related to atomic energy from the standpoint of New England employment. It may be useful as a check list in considering what opportunities might exist for New England in the broad field of atomic energy. In the right-hand column are estimates prepared by Arthur D. Little, Inc., of the potential employment within the next few years represented by the subjects in the left-hand column. These tentative estimates are quite general and are based on the premise that the pertinent atomic developments will fulfill the promise now held out for them and that New England will actively seek the opportunities. Further growth of the field still depends in part on continued Government financing of research and development at something like the present rate. It should be emphasized that the estimates *are not predictions of employment* but are estimates of possible *potential* if certain favorable combinations of circumstances materialize.

Guide to Employment Ratings

A = Employment potential for the next few years is *good*, in terms of the number of personnel that might be employed in New England by selected industries, if the pertinent atomic developments fulfill their present promise;
B = Employment potential is *fair* for selected industries in the next few years, if the pertinent atomic developments fulfill their present promise;
C = While an attractive situation *might develop* in the next ten years, it would not be expected from present knowledge.

Subject	*Estimated Employment Rating for Selected Industries in N. E.*
I. Government atomic military requirements (nuclear reactors, bombs, ships, etc.):	
A. Personnel for research, development	A
B. Other personnel for engineering, construction, operation, administration, etc.	A
C. Ores (uranium, thorium, beryllium, etc., requiring prospecting, mining, research, processing, fabricating, etc.)	B
D. Materials with special properties (metals, resistant to temperature and neutrons, Ti, Zr, Be, etc., pure graphite, heavy concrete shielding, clear thick glass, strippable or chemically resistant paints, etc.)	B
E. Equipment (requiring research, manufacture, distribution, service, etc.)	
1. Remote control handling equipment	B
2. Instruments for laboratory and plant, health monitoring, etc.	A
3. Chemical processing	B
4. Physical processing (diffusion, etc.)	B
5. Other special devices and equipment	B
F. Buildings, laboratories, and furnishings, requiring architects, engineers, construction workers, building supplies, etc.	A
G. Safety provisions (including "atomic" civil defense needs) such as shielding — lead, concrete, etc. — detection equipment, pharmaceuticals, supplies for decontamination in plant and possibly in field combat. (Civil defense needs depend strongly on war or fear of war)	A
H. Education of personnel for research, development, manufacture, operation, etc.	B
II. Medical research, diagnosis and therapy with radioactive materials, requiring:	
A. Personnel	B
B. Laboratories	C
C. Processed radioactive materials	B
D. Equipment for radiography, radiation, detection, etc.	B
III. Industrial uses of radioactive materials.	
A. Radioactive Tracers as a research tool, for example, for the development of new or improved products or processes requiring:	
1. Personnel	B
2. Laboratories	B
3. Processed radioactive materials	B
4. Instruments and special equipment	B
B. Special devices using radioactive materials as radiation sources, for example, thickness gauges, level finders, pressure gauges, radiographic equipment, fluorescent tubes, static eliminators, well-logging devices, etc. Requires personnel and materials for design, manufacture, distribution, service, etc.	A
C. Sterilization of foods, pharmaceuticals, etc., and other uses of high-intensity radiation still in development stages such as polymerization of resins. These uses require low-cost radiation, as from by-product fission products (or machine-generated radiations)	A
IV. Industrial atomic power plants for producing power and probably by-products such as fissionable material and fission products	*
V. New industries based on the possible future availability of low-cost commercial atomic power in New England: e.g., ground wood pulp, newsprint, electrochemical products such as caustic, chlorine, oxidizing agents, etc.; electrolytic production of metals such as tin, aluminum, magnesium, etc.; electric furnace products such as alloys, fertilizer and abrasives, etc.	A*

**Ratings similar to Section I above may apply here "if and when" atomic power is commercially practical for New England.*

Monthly Review
FEDERAL RESERVE BANK OF BOSTON

REVIEW OF THE THIRD QUARTER:

Business Pace Quickens

Stepped-up consumer buying and rising merchandise ordering by retailers sparked a faster pace of business activity during the third quarter in New England. Manufacturing activity expanded as textile orders reached the market and defense contracting held near its second quarter level. Construction activity carried on at near-peak levels as the housing market remained strong and commercial building expanded. Summer jobs in the vacation industry helped swell the August total of nonagricultural employment to the highest level of the year.

The tempo of consumer buying at New England department stores quickened during the third quarter. The index of department store sales, seasonally adjusted, moved upward at an increasing rate and at the end of August was 10 per cent above the low point in April. Sales of downtown Boston department and apparel stores dropped slightly in September, but increased sales in other New England stores raised the region's total slightly above its August level. Instalment sales of New England department stores jumped to levels substantially higher than a year ago after the elimination of Regulation W credit controls in May, but they tapered off in August. At the end of August, instalment accounts outstanding were 18 per cent higher than at the same time last year. Department store stocks hit a low point at the end of July, 16 per cent below those a year ago. However, merchandise orders increased sharply in July and August. Outstanding orders were 23 per cent higher at the end of August than they were last year.

Nonsecret defense contracting in New England during the third quarter held fairly close to the $347 million quarterly volume achieved during the April-June months. By September it was clear that ordnance contracts had won top position in the quarterly volume, accounting for about 26 per cent of the regional total. Nonsecret contracts for aircraft continued to be an important portion of the total, but their volume was much smaller than in the preceding quarter.

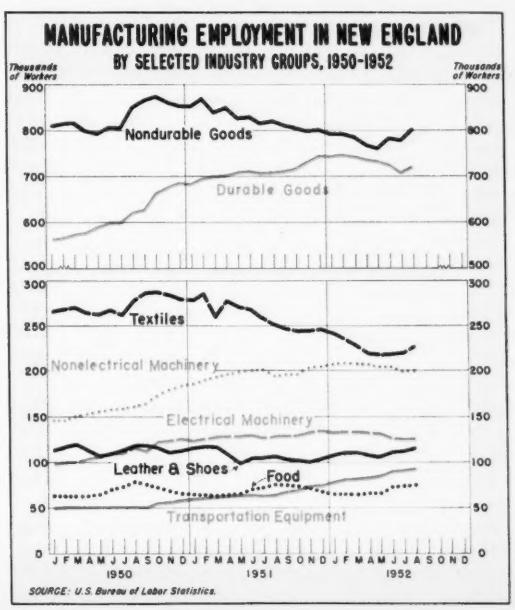
Heavy tourist travel in July and August boosted business of New England vacation lodging places to a postwar high. Lodging hosts entertained about 7 per cent more guests and took in 10 per cent more money in July and August than they did last season. All types of lodging places reported increased business, but demand seemed heaviest for cabins. Many price-conscious vacationers shopped for bargain accommodations.

Orders received by New England manufacturers apparently ran well below year-ago levels during the first six months of 1952, but during the third quarter they drew ahead of the volume in 1951. A revival of demand for consumer durables and nondurables — coupled with a lower level of inventories in the hands of retailers and manufacturers alike — caused an upturn in factory production. Finished goods moved out of the factories more rapidly, and production inventories rose. Nevertheless, retail and factory stocks of shoes, appliances, television sets, and textiles seemed to be in short supply relative to demand. In some seasonal lines, a loss of sales threatened.

Both retail and wholesale prices rose at the beginning of the third quarter, but they were declining toward its close. The Boston consumers' price index reached a high for the year in July, while the retail price index for large Massachusetts cities reached a peak in August and then declined. The food component of the Massachusetts index declined most in the August-September period, but it was nevertheless almost four per cent higher than in September 1951. The daily index of 28 basic commodity prices on spot markets fluctuated little during the quarter. During September there were considerably more price declines than increases among the 28 commodities.

Manufacturing employment in New England dropped abruptly in July under the impact of strikes in the steel industry and subsequent material shortages. The addition of 5,000 persons to nonmanufacturing working forces only partially offset a drop of 23,000 manufacturing employees. In August, the tables were turned. Manufacturing employment swelled by 37,000, more than enough to offset a 3,400 contra-seasonal drop in construction employment. The construction reverse was caused in part by shortages of structural steel. As the quarter ended, employment was rising from a level almost equal with the year-ago total.

New England's third-quarter construction program maintained the accelerating pace that first appeared in the second quarter. The value of all construction con-



tracts awarded during July and August was 12 per cent higher than in the same two months of 1951, according to the F. W. Dodge Corporation. In the thirty-seven eastern states the value of all construction awards was also up 12 per cent.

Residential awards were 28 per cent higher than in the same months last year, though awards for apartment houses and public housing leveled off. Nonresidentials were up 12 per cent, but the year-to-year gain jumped to 70 per cent in early September. Awards for public works and utilities, public and private, fell well below year-ago levels.

Commercial loans at Boston banks rose about 7 per cent between June 30 and October 1. At the country banks, however, the increase in commercial lending was limited to about one per cent. Outstanding district business-loan volume on October 1 exceeded the level reported at the same time last year by 5 per cent.

Food, tobacco, textile, apparel, and leather manufacturers and finance companies increased their borrowing considerably during the quarter. Firms processing metals or metal products and commodity dealers made small or moderate net repayments of loans. Firms in wholesale and retail trade made only small net increases in loans. A smaller portion of loans went to defense and defense-supporting activities.

Durable-Goods Industries

New England's durable-goods producers had greatly differing experiences during the third quarter. Metalworking firms making consumer products contracted sharply in July but bounced back in August and September. In contrast, the region's aircraft and ordnance firms continued to expand throughout the quarter.

Producers of **nonelectrical machinery** were active in the third quarter. During the spring months, slackened orders and high cancellations resulted from a military shift in emphasis from piston-type engines to jets. During the third quarter, however, orders picked up and the rate of cancellations dropped sharply.

Machine tool producers continued to expand capacity and increase output even though the national backlog of orders dropped from twenty-three months' production last year to twelve months as of September.

Manufacturers of **electrical machinery** operated at reduced levels during the summer months except for concerns working on government orders and in the electronics field. Output of heavy electrical machinery was curtailed by shortages of silicon steel during the steel strike. Demand for electronic tubes and components continued strong as New England continued to support the defense build-up. Consumer demand for electrical appliances picked up sharply during the summer, and production schedules were expanded.

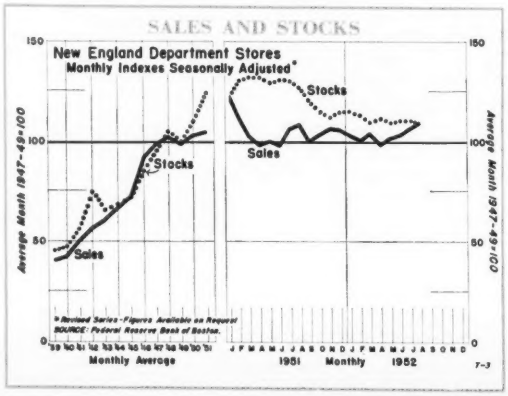
The New England **metalworking industry** continued on a slightly downward trend during July and August. While the steel strike and material shortages were factors in some cases, most cutbacks were attributed to lack of orders rather than lack of materials.

Following the steel strike, New England's three open-hearth steel shops snapped back into operation and the region's rate of operation rose to 92 per cent of capacity by the third week of August; it slid off to the lower 80's by the end of September. Products that were in easy supply before the strike gradually returned to their prestrike easiness. Among these were wire, cold-rolled strip, and wire rope. During July and August, firms making fabricated-metal products showed a greater falling off in activity from a year ago than did primary-metal producers. This was especially true of the hardware industry, which has received little support from defense orders.

More business for New England shipyards sparked a third quarter expansion of the **transportation-equipment** industry. In August, shipyards in the Greater Boston area employed about 10 per cent of all the shipyard workers in the nation. New contracts for tankers and a second nuclear-powered submarine swelled backlogs at Quincy, Massachusetts, and Groton, Connecticut. At New Haven, a newly formed aircraft firm hired about 1,400 workers during the three-month period.

New England **ordnance** plants continued to expand operations during the summer months, with greatest gains at government plants. Nonsecret government contracts for ordnance placed with New England concerns during July and August were at an average rate of approximately $26 million monthly.

Lumber production and distribution, both softwood



and hardwood, moved along through the quarter without implications of either "boom" or "bust." The market for the higher grades of hardwood improved as the furniture business strengthened. Continuation of construction at high levels supported the softwood lumber market. Hardwood and softwood producers continued to meet moderate difficulty in disposing of their lower-grade material. Signs of price weakness for softwood lumber appeared in mid-September.

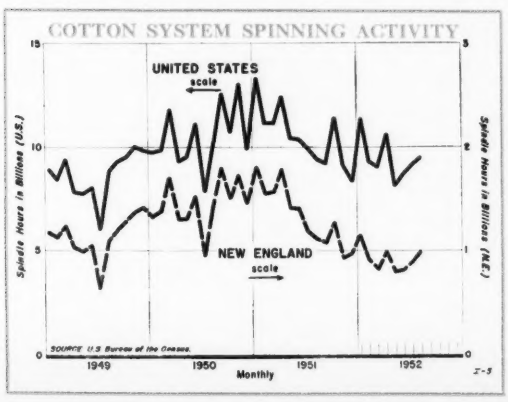
The larger **furniture** plants enjoyed good business during the early part of the quarter. Depleted retail stocks and continued active buying by the public was reflected in lengthening order backlogs at the plants by mid-August. Employment at Gardner, Massachusetts, at the end of August was 12 per cent above employment on the same date in 1951 and higher than on any corresponding date since 1948. The Boston furniture show in early September produced a highly satisfactory volume of orders.

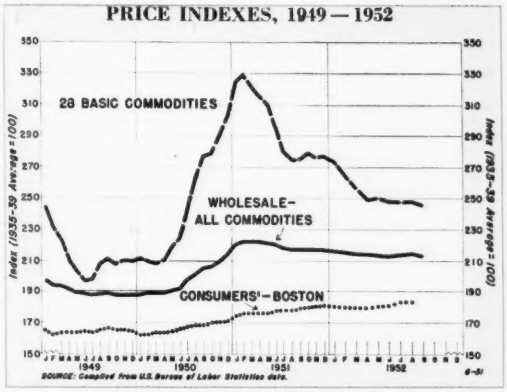
Nondurable-Goods Industries

New England's nondurable-goods producers staged a revival during the third quarter. A quickened flow of orders for textiles was the most noticeable change, but early signs of the expected seasonal rise were widely observed in August and September.

Textile employment in New England began to pick up in June, and the improvement apparently continued throughout the third quarter. The number of workers who filed claims for unemployment benefits in the wool-textile centers declined steadily throughout the quarter. In the cotton-rayon cities, similar improvement began to appear in early August, and employment conditions subsequently improved steadily. As the quarter ended, print-cloth prices were healthy, and mills were largely sold up through the rest of 1952. Activity at worsted mills had not come up to expectations, and orders for rayon fabrics were reported to be declining, but optimism was prevalent.

New England **garment shops** were operating at peak levels at the end of September, as producers strove to fill commitments for fall and winter merchandise. Seasonal expansion got under way a little earlier than usual at women's wear plants. Early ordering was slow in men's wear lines, but by September most plants were operating at capacity with many reportedly sold out





for the rest of the season. Excess inventories that caused difficulties a year ago were under control, and buyers continued to follow a cautious ordering policy.

As the third quarter ended, New England **shoe** plants were completing a satisfactory fall season, with both production and employment registering well above the levels of a year ago. Reduced inventories at the end of the spring selling season encouraged the placing of a good volume of orders for fall and winter shoes. Plants turning out women's and children's shoes enjoyed the largest gains. September strengthening of prices for hides and skins raised the prospect for higher prices for leather and shoes in months to come.

After one of the poorest spring seasons in recent years, **jewelry** production began to pick up in May and June. After the vacation shutdowns, expansion of production was hampered in many plants by shortages of experienced workers. The volume of orders was good, but buyers were still cautious and placed smaller orders. Easing of copper and tin restrictions helped the industry in presenting attractive lines.

A pickup in the volume of orders received from both government and civilian buyers permitted some New England manufacturers of **rubber products** to expand operations during the quarter. Employment continued to lag behind last year's level, however.

Activity in the **printing and publishing** field continued at a slightly lower level than a year ago. As the quarter ended, seasonal expansion was well under way at greeting-card plants where production of Christmas cards is important.

Uneven demand, together with large inventories, kept production in New England's **pulp and paper industry**, with the exception of newsprint manufacture, at low levels until mid-August, when faint signs of better times began to appear. As the quarter ended, the balance was delicate, but the paper and paperboard price structure remained unshaken. Wood-pulp prices have exerted no pressure on legal ceilings during the quarter. Newsprint manufacturers announced price increases of up to $7.00 a ton effective October first.

Plant expansion was the keystone of business trends in the **chemical industry** during the third quarter. The industrial-chemical section of the industry was in the forefront with plans for investing $20 million for the production of plastic resins.

Income Payments Increase Ten Per Cent in New England

INCOME PAYMENTS to individuals before taxes increased in 1951 in every state in the nation, mainly because expanding demand brought forth a rise in prices and business activity. The percentage gain from 1950 to 1951 was 12 per cent for the United States. In New England income payments advanced by ten per cent and reached $16,057 million in 1951. Among the New England states, only Connecticut, with a 14 per cent rise, exceeded the national increase in total income payments to individuals. New Hampshire recorded an 11 per cent advance, Vermont ten per cent, Maine and Massachusetts each nine per cent, and Rhode Island eight per cent.

In considering changes in income, one should remember that dollar comparisons can be misleading. Part of the increase in income payments was due to a rise in prices. The national Consumers' Price Index rose eight per cent from 1950 to 1951. Furthermore, figures on income payments to individuals represent income before taxes. Taxes advanced substantially in 1951.

Differing rates of population growth also affect regional totals of dollar income payments. New England's population increase has been less rapid than that of the nation since 1948. The region's per capita income, however, has risen slightly more than that in the rest of the country. In 1948 New England's per capita income exceeded the national average by six per cent, in 1951 by eight per cent.

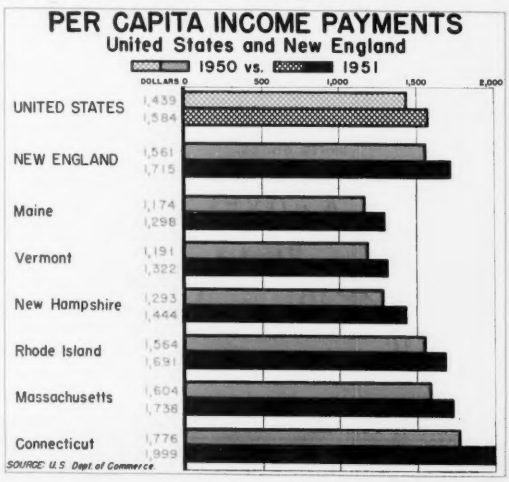
A ten per cent gain in per capita income in New England between 1950 and 1951 exactly matched the gain in the United States. All New England states except Massachusetts and Rhode Island had above-average increases in per capita income from 1950 to 1951.

Connecticut's 1951 per capita income of $1,999 was exceeded by that of only Delaware, Nevada, and the District of Columbia. Massachusetts, with per capita income of $1,738 in 1951, ranked eleventh among the 48 states, and Rhode Island, with $1,691, ranked fifteenth. The three northern New England states had less than average per capita income.

Income from all major sources increased in the country as a whole from 1950 to 1951. Farm income increased almost one-fifth due to near-record production and higher prices for most farm products. Individual states showed widely varying percentage changes around this average. Agricultural income was the most expansionary source of income in many states. In others, however, it had a dampening influence. Income from agriculture declined 24 per cent in Maine, primarily due to low prices for potatoes.

Manufacturing payrolls increased 18 per cent from 1950 to 1951 both nationally and in New England. The increase in factory payrolls in New England partially offset the area's smaller-than-average gains in property, trade and service, and agricultural income. The 18 per cent gain in manufacturing payrolls had greater influence on the New England income achievement than on that of the country as a whole because factory payrolls are a more important source of income in every New England state than they are in the nation. Wages and salaries of factory workers made up nearly one-third of total income payments to individuals for the six states as a group, a greater proportion than in any other section of the country.

While factory payrolls expanded in every New England state, the increase differed from state to state, depending on the predominating types of industry. Connecticut recorded a 26 per cent rise in manufacturing wages and salaries, because of the importance of the machinery, fabricated metals, and aircraft industries in Connecticut. Many concerns in those fields were engaged in defense or defense-supporting work which expanded greatly in 1951. Greater dependence on industries which did not receive much stimulus from the 1951 demand situation, principally the textile and leather and shoe industries, accounted for below-average gains in manufacturing payrolls of 15 per cent in Massachusetts, 11 per cent in Rhode Island, and 16 per cent in New Hampshire. Vermont relied more on metalworking and machinery industries and showed a 26 per cent rise in income from manufacturing sources.

New England had the same seven per cent increase in income from government sources as did the nation. The regional gain was a composite of above-average increases in Maine and New Hampshire, primarily due to expansion of military facilities in those states, and below-average advances of only two and three per cent in Connecticut and Vermont. Wages and salaries paid to employees of New England's trade and service establishments and proprietors' income in 1951 stood eight per cent above the figure for the preceding year, as compared to a national average gain of nine per cent.

The decline in the proportion of total United States income received in New England from 6.70 per cent in 1950 to 6.61 per cent in 1951 reflects continuation of slower rates of population growth and industrial development in the older industrial areas. Inter-state differences in per capita income have narrowed for the past 20 years as the poorer states have recorded greater percentage gains than the more prosperous ones.